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THE WEATHER-SERVICE OF THE UNITED STATES.

IT will be remembered that during last winter and spring, public attention in this country was attracted to the weather-prognostications sent over to us from the United States. At first, they were spoken of with some degree of flippancy, there being a general inclination to treat them as simply 'Yankee productions,' and nothing more. It is a curious feature of the relations of this country to America, that we can never receive with credence any startling news from across the Atlantic until it has been verified beyond possibility of doubt. It was so with the first weather-prognostications. But as it began to be observed that these predictions were generally fulfilled, although occasionally a day sooner or later than the time fixed, scepticism began to give way, and something like reasonable attention was paid to the meteorological telegrams from over the water. These were not always satisfactory to our agriculturists, especially when there was a run of 'storm-warnings;' one homely farmer having been heard to declare that the weather had been a perfect heartbreak ever since the Americans had got its management. The predictions, however, are no haphazard announcements, such as those of certain almanacs or the penny weather-tables; they are obtained from strictly scientific calculations, founded on extensive, accurate, and simultaneous observations over a wide area of sea and land. As a very full and authoritative account of the Signal Service of the States is given in a recent reprint from *Appletons' Annual Cyclopædia*, published in New York, we believe many of our readers will be interested in having here a condensed statement of the facts.

The meteorological division of the United States Signal Service was established in 1870. Modern inquiry into the changes taking place in the weather, and especially into the phenomena of storms, had for many years previous strengthened the conviction that they are not capricious, but follow certain laws. The essential thing to be accomplished, therefore, was to ascertain what were the laws which governed these phenomena, with the conditions under which they operated, or in which they had their origin. Previous to this time in America, and for long after in Europe, the observations made were of a purely independent and isolated kind, and their records were consequently of little value except for purposes of local meteorology. It was felt that to be of any value for general purposes, the observations should be *simultaneous*—should be made at the same moment of time at fixed stations spread over a wide area of country. America offered peculiar advantages for the making of such observations, from the peculiar and vast extent of its territory, stretching over fifty-seven degrees of longitude and twenty-two of latitude. The organisation of a staff for this purpose was therefore set about; signal-stations, connected by telegraphic wires, were placed at wide intervals over the country; an efficient set of instruments and all necessary apparatus were supplied to each; and on the 1st of November 1870, the Chief Signal Officer of the United States was able to issue the first systematised *simultaneous* reports of the weather, made up at twenty-four different stations. The whole were received at the Central Signal Office at Washington, and thence telegraphed to more than twenty cities. The first storm-warning was bulletined along the lakes a week later, for the benefit of the large commercial and marine interests which are exposed to the furious gales that sweep, especially in autumn, over their waters. These tentative attempts were vigorously followed up by improved methods, and still more extended and accurate observations; and the success realised was as gratifying to the public as to the Office itself.

From almost the first, it was felt that, to arrive at satisfactory results, it was necessary that every separate series of observations should be carefully mapped as they were received by telegraph. With this view, a special map of the United States was constructed, on which all the Signal Service stations were marked in their appropriate geo-

graphical places, and at each of these were entered the figures expressing the readings of the barometer and thermometer, the velocity of the wind, the amount of rainfall within the previous twenty-four or eight hours, &c., as also symbols indicating the direction of the wind, and the form and amount of cloud at the given time of observation. The reports from the different stations being entered on the map, the relations between them are thus made sensible to the eye of the Signal Officer, by the figures and symbols, as also by lines drawn to group the geographical areas over which like conditions prevail. The weather-map in this way becomes to the meteorologist what the telescope is to the astronomer—an indispensable means of obtaining a survey, and prosecuting a careful and connected study of the phenomena he seeks to understand.

The study of these maps is as curious as it is interesting. Long before the institution of the Signal Service, it had been discovered from ship-reports that on the sea, cyclonic disturbances in the northern hemisphere rotate from right to left—that is, in a direction contrary to the hands of a clock; and scientific men had demonstrated that, mathematically or mechanically, this law should in theory hold good for both land and sea. The weather-maps have now confirmed this. In a specimen-map for December 23, 1879, given in the report, there are two areas marked 'LOW,' and one 'HIGH'—the former defining a storm or cyclonic area in which the barometer is low, and the latter the limits of an area free from such disturbing influences, and in which the barometer is high. In the former—or stormy area—the winds are seen to draw in a direction contrary to the hands of a clock; while in the latter area, which is free from storm, the winds move in the opposite direction.

In this way, it will be apparent, there is nothing left in a conjectural condition, so far as the observations are concerned; and constant study of these observations from day to day, with their antecedents and consequents, enables the Signal Officer to arrive at a fairly accurate estimate of the kind of weather that may be expected within a given time. Yet the preparation of the 'Synopsis and Indications' for the day is by no means a light task, but involves much labour and care. There are *three daily press reports issued*, and the work required before each of these is prepared, includes the drafting of eight graphic charts exhibiting the multiform data furnished by the simultaneous reports telegraphed from the several stations. Each of these eight charts has a separate duty to perform. One shews the barometric pressures, temperatures, winds, &c.; another, the lines connecting stations where the barometric pressure and the heat are the same; a third exhibits the cloud-conditions, with the 'weather' at each station, including the appearance of the sky at sunset, which is an important indicator; a fourth gives a chart of the *normal* pressures; and so on, till each of the eight sheets is charged with its particular series of observations. These charts have all to be drafted in about an hour or an hour and a half; and they are inter-corrective, each chart serving as a check on the others. Armed with this material so prepared, it is the duty of the officer charged with the preparation of the 'predictions' to proceed to make up his 'synopsis' of the whole, to deduce and write the 'indications,' shewing the changes to occur afterwards; and as soon as this is done, the deductions are telegraphed direct from the Chief Signal Office to all parts of the country.

The Service, as we have stated, began ten years ago, with twenty-four signal-stations; now it has two hundred and ninety; and the average time elapsing between the simultaneous reading of the instruments from each of these stations and the issue of the deductions, has been calculated at only one hour and forty minutes. The forecasts or predictions thus issued apply generally to the next twenty-four hours, but may frequently cover double that period.

The object of the organisation of the Signal Service was one of much importance; and the success which has attended its predictions is certainly remarkable. In the previous state of the science, meteorology was simply a proverb for inexactness; now this imputation is likely to be removed. A table is given of the percentage of verifications over an area of hundreds of thousands of square miles, in each month of the year ending June 30, 1879, and the results are sufficiently surprising. The average of the percentage of accuracy referring to predictions of barometric, thermometric, wind-direction, and general weather changes (involving the most difficult of the calculations that require to be made), is 86·6. The percentage of accuracy of the forecasts of the weather alone (including the state of the skies, whether clear, fair, or cloudy, and whether with or without rain), is 90·7. That is, out of every hundred predictions of the phenomena which are most difficult to forecast, only fourteen turn out to be wrong; while out of every hundred predictions which are purely forecasts of the weather, ninety are found to be right, and only ten wrong. In contrast to this, it may be mentioned that in 1862, when the British government wished to test the real value of the work done in the home Meteorological Department under the old or non-simultaneous system of reporting, it was ascertained that out of four hundred and thirteen storm-warnings that were given within six months, only two hundred and fourteen were accurate. That is, under the old system, the percentage of accuracy was only 51·8, as against 90·7 attained last year in the American Service. This is astonishing evidence, not only of the care and accuracy with which nearly three hundred independent observers in the United States do their work, but also of the scientific skill and acumen which must be brought to bear upon the consideration of these numerous reports when gathered together, so as to obtain for the several areas such 'deductions' and 'predictions' as the multiform and complex nature of the observations warrant.

One interesting feature of this elaborate organisation is the establishment of what are called 'Sunset-Stations.' These are in addition to the ordinary signal-stations; and the method of predicting the next day's weather, followed at the sunset-stations, is within the grasp of any unscientific but intelligent observer. It is achieved by careful study of the conditions of the sky at sunset, the observers noting whether the western sky at the precise time of sunset is 'fair,' 'foul,' or 'doubtful;' and from these, along with certain simple instrumental observations, they make

predictions for the ensuing day. The sergeants of the Signal Corps practised in this kind of forecasting, are said to have acquired considerable skill and accuracy in predetermining the local weather-changes, their forecasts having reached an average of eighty-two per cent. of accuracy. 'There can be no reason,' says the Chief Signal Officer, 'why any intelligent farmer, supplied with the necessary simple instruments, habituated to similar observations, and furnished with dates, should fail to attain an equal accuracy.' To facilitate the making of such private forecasts, especially by those agriculturists who live in regions remote from places where daily reports are published, the Chief Signal Officer has caused to be prepared a 'Weather Case, or Farmer's Weather-indicator.' This instrument is very simple, and works automatically; it is also accompanied by instructions and rules for interpreting the instrumental variations; and has the effect of enabling the agriculturist to determine for himself the chief weather-changes that may be expected. When will the home Meteorological Office do as much for the British farmer?

Another important branch of the system is the 'Coast Signal Service.' The object of the Coast Signal Stations is to warn vessels within signalling distance of the approach of storms, and to give the life-saving stations quick notice of marine disasters calling for rescue, as also to furnish any intelligence to the latter, or to the lighthouses, which may insure their more efficient working. 'Ocean conditions' often foretell a storm, the indications of which may not have as yet reached land; consequently, it is considered of the utmost importance that frequent reports should be telegraphed to and from all the shore stations of whatever observations are made. In the life-saving department alone, instances are given which shew how beneficial it is to have regular and constant telegraphic communications between the Chief Signal Office and the life-saving stations, as in this manner help can be called and means of saving life combined to an extent that would otherwise be impossible. In the event of war also, this organisation would be highly advantageous; as, with a completed chain of coast signals such as they have in North America, no part of their exposed sea-front could be threatened without immediate intelligence of the fact being flashed to the Washington Office and all along the coast, and the defensive power of the government concentrated at the point endangered. The chain of telegraphic sea-coast stations is at present six hundred and ten miles long, stretching from Sandy Hook to the mouth of Cape Fear River.

But all these several branches are subordinated to the continual every-day use of the organisation as a Weather-Service. And in America, as in this country, the value of such timeous notice of important weather-changes as is thereby obtained, is daily rising in the estimation of the public. 'The number of persons,' says the document from which we quote, who find that the reports and forecasts of the Service may be utilised for every-day life, is constantly increasing. Grain and cotton merchants find the "indications" of value in calculations of the forthcoming crops. Physicians, sanitarians, and boards of health employ their data to detect dangerous conditions of the atmosphere of the cities, and for investigating the origin and spread of diseases and epidemics. The pork-packers, fruit-importers, and fish and oyster dealers, keep an eye on them, to secure themselves against exposure of perishable goods to weather too damp or too warm. Mechanics judge from the prognostics whether they can work outside on the morrow.' And so on, through the great variety of persons and pursuits that are more or less dependent upon the weather.

The information thus supplied is clearly of immense value. 'Had we, a quarter of a century ago,' says a British meteorologist, 'known the rigour of the Crimean climate, who would have dared to send out an army unprepared to meet the hardships of a Black Sea winter? Ask the physician at what price he would value the power of giving timely warning of a "cold snap" to his patients. Ask the builders of London what they have lost in the last ten years by sudden frosts or unexpected downpours of rain. Above all things, go to the farmer, and ask what he would freely pay to know at seed-time what weather he might really expect in harvest. The fact is, there is not a profession, not a handicraft, not a process in animal or vegetable life, which is not influenced by meteorological changes.' It is, however, satisfactory to mark the efforts which are now made by the Meteorological Office of London to render daily forecasts of the weather all over the British Isles.

MY HOLIDAY IN JAMAICA.

CHAPTER III.—AN 'AT-HOME' DAY IN JAMAICA—MISS MARTIN—NEW-CASTLE ENTERTAINMENTS.

THE house is of wood, white, with green venetians, and wide veranda, the blinds of which are half-drawn. In front stretches a close-shaven tennis-ground, which a powerful young negro is rolling. To the right of the house springs up a magnificent specimen of the Norfolk Island pine. There are, I was told afterwards, only two or three in the island. Broad gravel-walks run all round the house, bordered with tubs containing different sorts of lilies—among which the magnificent Eucharist lily is conspicuous—aloes, some splendid double geraniums, and a great variety of plants with leaves specked, some with white and some with red spots, whose botanical names I know not. A shout of 'Papa, Papa!' and a sturdy boy of four years or thereabouts breaks away from his nurse, and flies to meet us; while Mrs Edgeware appears on the veranda with a younger child clinging to her skirts. Marriage has made little change in Mrs Edgeware. With her slight figure and neat white dress, a wide straw-hat shading the piquant features and laughing brown eyes, it requires an effort to realise the fact that she is not the Elsie Graham of five years ago, but a staid matron with two children. Dismounting from our ponies, which walk off by themselves to their stable, I am warmly greeted by my hostess, and despatched off to my room, with the announcement that breakfast will be ready in half an hour. Except small strips beside the beds, there is not a scrap of carpet in the house, and the polished pine-floors look deliciously cool.

Presently we are seated at breakfast in a pretty room, painted pale green, communicating by folding-doors with the drawing-room. All the windows and doors are wide open, and we breakfast in a thorough draught that would give many a Londoner fits. There are splendid roses everywhere—pink, yellow, and crimson. They nestle among the silver and glass on the breakfast-table, and positively swarm in the drawing-room. Breakfast over, we adjourn to the veranda, and lighting our cigars, listen lazily, while Mrs Edgeware tells us her plans.

'To-day is our At-home day,' she began; 'so you'll see all the people about, if it doesn't rain. The Judge and the Dean are sure to come. You can see the Judge's house from here;' pointing to a pretty cottage on a neighbouring hill. 'Then we'll have the New-Castle people. The Colonel and his wife are coming to lunch.'

'What about to-morrow?' asked Charley. He had his first-born on his knee, and was busily engaged in puffing cigar-smoke at him; a proceeding strongly resented by the boy. 'Don't the New-Castle theatricals come off to-morrow?'

'Now, do let the boy alone,' said Mrs Edgeware, rising and rescuing the child, who immediately made a dash at a big butterfly that flew by. 'Yes,' she went on; 'they do; and I 'm afraid we must have an early dinner.—I hope you don't mind, Mr O—— ?'

'Certainly not,' I replied with unction, though I cannot say that I am partial to that ghastly meal.

'You see, it 's an hour's ride,' she continued; 'and it 's dark at six. And we really must, Charley'—turning to the Major—'get over the bad part of the road before dark.'

'All right,' replied Charley.—'By the way, Jack, we must stay there all night.'

'All night!' I cried in surprise.

'There 's no moon,' said the Major; 'and no pony on earth could come down in the dark; so the supper is to be at twelve, and we 've to dance the daylight in. I must go to Kingston to-morrow, partly on business, and partly to see the King girls, who are coming to stay with us. We 'll have early dinner or late lunch about half-past three, and start a little before five.'

And so the discussion went on; and it was settled who was to have the blue room and who the brown, and where the two officers from Up-Park Camp were to be put up, and which young lady was to ride the kicking pony, and how the Dean's mule Belinda was to be borrowed for Miss Bella Moore, who was nervous; while I sat in my rocking-chair, idly watching the John-crows (a species of vulture, which act as scavengers) circling overhead, and the busy little lizards running up and down the pillars of the veranda. Right opposite the door-steps, which are bordered by flower-pots on each side, is a magnificent akee tree, with drooping clusters, slowly reddening. Listen to that faint whirring. A tiny humming-bird, its plumage flashing in the sun, balances itself opposite that hybiscus blossom, plunges its sharp beak inside the flower, and then, flashing across the steps, repeats the operation on a flower close by my feet. The whole space to the left of the steps is filled by a splendid Poynsetsia tree. Half its leaves are the most brilliant crimson; half, green. By Christmas, all the green will have vanished, and it will be one glowing mass of crimson; then the crimson will go in its turn, and by July the tree will be all green again. A high border of lemon-grass surrounds the close-shaven lawn; and one or two mango-trees, dotted about, contribute the welcome shade. A range of offices to the left of the house is covered with the gorgeous reddish-orange clusters of the *Bigonia venusta*. It is my first taste of the tropics, and I enjoy it thoroughly. The heat is tempered by a light sea-breeze, which comes stealing up over the hill-tops, and stirs the long fleecy coat of Mrs Edgeware's white poodle Floss, lying sleeping at her feet. In front, I can see St Mark's Church, with its pale yellow walls and green venetians, standing out in bold relief against the dark-green background of mountain. To my left, I can look away over the spurs of the hills upon Kingston and the shipping in the harbour; still farther out, upon Port-Royal and the west shore of the bay.

'What a delicious climate!' I exclaim half involuntarily.

'It will be better after the rains,' replied Mrs Edgeware—'not so hot.—But here they come,' she said, gathering up her work, and pointing out to me a row of white helmets defiling by the church-gate.—'I declare, Charley, there are five of them!'

'All right,' said the Major, touching a small spring-bell beside him.

The black butler appeared.

'There are eight for lunch instead of five, Chance;' and that functionary disappeared. The arrangements in all Jamaican houses are of a wonderfully elastic nature.

'Whom have they with them, I wonder?' said the Major.

'Whoo-op!' from the hill.

'I know one of them, at all events,' said Mrs Edgeware, laughing—'that 's young Mr Leslie.'

'Ay,' said the Major, 'he 's always hollering.—Come on, Jack, and meet them. Best take that white umbrella; sun 's a bit strong for strangers.'

And we saunter out just in time to meet the cavalcade at the gate. Colonel S—— leads the way on a powerful bay horse, which looks as if—as is indeed the case—he would be more at home over a grass country. Mrs S—— is mounted on a beautiful white Barb. The other three are riding wiry mountain ponies. Tweed breeches and gaiters, or blucher boots, are worn by the men. The ladies are in ordinary morning-dress, the skirt of the dress being pinned up all round, and the skirt of a riding-habit slipped over it. When they dismount, the habit-skirt is let fall, the dress underneath unpinned and shaken out, and the toilet is complete. The Colonel, an old Crimea-man, and his wife, are Irish. So too is the dapper subaltern with them. The other two are a planter and his wife, a pretty fair-haired English girl. Everybody is introduced to everybody; and presently we are seated at lunch, for which the mountain air has given us a famous appetite.

Lunch over, visitors begin to drop in. I am introduced to various notabilities, Judges, Generals, Archdeacons. Being a stranger, I am made much of, and receive half-a-dozen invitations to various parts of the island. As the day grows cooler, we adjourn to the lawn-tennis ground; and though I rather fancy myself at that game, I find I have to

do all I know to play up to the game of my partner, Miss Martin, a pretty dark-eyed Creole.

'Of course you're coming up to New-Castle to-morrow?' she remarks as we are refreshing ourselves with some claret-cup after winning our rubber.

'Certainly,' I answer; 'the Major is going to lend me a pony.'

'We're all going,' she went on; 'papa, my two sisters there'—nodding towards two young ladies in white dresses trimmed with red—'and myself. It will be great fun. We live over at the north side, you know, and have only got a loan of Mount Topaz, where we're staying now. At home, we never have a dance, and here we've had two already; and there are three coming on—the one to-morrow, the Governor's ball, and the Up-Park Camp dance. You must come over to our side of the island, and pay us a visit. Papa would be delighted to see you; and we'll have a paper-chase. Of course you can ride?'

'A little,' I murmured modestly, wondering vaguely what connection there could be between a paper-chase and riding. 'But isn't running rather warm work in this climate?'

'Running!' exclaimed my young friend, opening her brown eyes wide. 'Surely, you don't suppose we run! No, no—we ride. Last paper-chase, we had fences, and a ditch eight feet wide. Rita and I tumbled into it together. Luckily, she wasn't hurt.'

'Luckily, *you* weren't,' I interposed.

'Oh, nothing ever hurts me,' she replied carelessly.—'By the way, you never saw Rita?'

'Never.'

'Oh, I must shew her to you then. She is *such* a dear!' she cried enthusiastically. 'Come on;' and she led the way across the tennis-ground to where the horses were hitched up near the entrance-gate. 'Here is Rita,' she said, pointing out a very beautiful dark chestnut mare, that raised her head and whinnied as her mistress approached. 'Her father and her grandfather won the Derby,' she continued solemnly.

It was a pretty sight to see the slight, dark-haired girl pressing her fair cheek caressingly against the glossy crest of her favourite.

'If you come to Mount Auburn, I'll let you ride her.'

I expressed my gratitude; and we strolled back to the tennis-ground, where the party was about breaking up. Some of them had considerable distances to go, and in these latitudes it gets dark in a few minutes after the sun sets. So adieux were exchanged, habit-skirts donned, girths tightened; and in a few minutes the procession was winding its way up the hill; Miss Martin, as I settled her habit, desiring me to be particularly careful not to be late for the second fast dance at New-Castle, which she had promised me.

The sun was now sinking fast behind the opposite hill, crowned with the Judge's house, and flooding all the horizon with a glare of golden light. But the glare was not for long. Even as we looked, the bright tints paled, faded, and died out. Almost as if a curtain had been drawn across, darkness fell on the scene. I don't know whether others have experienced the feeling, but to me, as I lounged on the veranda, finishing my cigar, there seemed something inexpressibly saddening in this sudden death of the day. But with the darkness burst forth a charm of innumerable insects. Tweet-tweet, twitter-twitter. Then the crescent moon, low in the south, sank behind the shoulder of the Judge's hill in a flood of pale-green light, which threw out in bold relief the black mass of the mountain and every tree and shrub on its summit. Presently, this light also died away, and the stars shone out like points of steel. A low muttering of thunder, and wave after wave of lightning, varying in shade from bluish-green to orange, flooded the western horizon. It was inexpressibly beautiful; and I left it unwillingly, when summoned to dinner. Clear turtle-soup, mountain mullet, and most excellent small mutton, formed the main features of the repast, which was washed down with champagne, produced by the Major in my honour. Cigars and coffee on the veranda, where I fell asleep, and dreamed that I was cruising in the bay with Peter Simple and Midshipman Easy, when I fell overboard, and was on the point of being swallowed by Port-Royal Tom, when Miss Martin, in a cocked-hat and naval uniform, fished me out with a boat-hook. I woke up with a start, to find Charley shaking me by the collar.

'Wake up, old man!' he said; 'you're about done, and it's not quite safe sleeping in the night-air.'

So, apologising for my rudeness, I said good-night; and was soon ensconced behind the mosquito curtains, rejoicing at finding myself in a decent bed once more.

Half-past six A.M., and I am awakened by a rattle of pony's hoofs, and a tapping at my window with the end of a hunting-crop. It is the Major, fresh, trim, and clean shaved, on his favourite pony Conrad. 'I'm off,' he said; 'have to go and look after one of the dams on the Hope River first, and then to do chaperon to the two Miss Kings up here. But Elsie will take care of you. She is going to dress at New-Castle at Colonel S——'s, and is sending on her things; so, if you like, you can send on your dress-clothes; Chance will look after them for you.' And he cantered off.

Then Chance, the black butler, brought me in coffee and thin bread-and-butter; and I dressed, and strolled out. Taking the road to the right, I walked up the hill to St Mark's Church, a neat unpretending wooden structure, with drab walls and green venetians, and one or two pretty memorial windows of stained glass. The path up to the church was bordered with neatly kept flower-beds, edged with the graceful lace-plant. Beyond these were lines of graves. Three graceful white stone crosses were conspicuous objects. Two marked the last resting-places of the wife and daughter of a former tenant of Craigton; the third, that of a major of Artillery. All three had fallen victims to yellow-fever, which, in the year '77, had visited almost every house in the Port-Royal hills. (It may interest intending visitors to Jamaica to state that yellow-fever never originates in the hills. I was informed by a physician of large experience in Jamaica, that in the year above referred to, the disease was brought into the hills by a gentleman who came up actually suffering from it. In every subsequent case that occurred, each link in the chain of contagion was clearly proved.)

The different views from this point were magnificent. Looking south, the eye can range over Kingston out to the Palisades and Port-Royal. Away westward stretches a huge plain, through which runs a faint line, the railway to Spanish-town, the former capital. In the valley about a thousand feet below me, as I look northward, lies the little hamlet of Middleton. A certain Duke has a large coffee-property stretching up the slopes on the opposite side of the valley, and the works are in Middleton. Looking straight across the valley, I see the white huts of New-Castle running down a huge spur that on the west of Catherine's Peak juts down southward. You can also trace the road to New-Castle zigzagging up the rugged sides of the spur.

The sun was now getting strong, so I strolled back to breakfast and a long gossip about all our acquaintances of the old times—who was dead, who married, and who ruined. Then my fair cousin gave me an account of their mode of life in Jamaica, during the recital of which she was oddly interrupted at times. A knock at the door. 'Come in;' and enter the cook, a stout young negro of two or three and twenty. He carries a wooden tray containing eggs, a couple of pine-apples, and a quantity of limes.

'Want a heighteen-pence for hegg, a shillin' for pine, and a truppence for lime, Missis,' he says; and Mrs Edgeware gives him the money. Presently he reappears: 'Two pair fowl, Missis, tree-an'-six-pence heach.' (I may remark that the negroes are the veriest Cockneys in the matter of their *h*s.) Eggs, fowl, vegetables, fruit, &c. are brought to the door by the country-people for sale, as in country-parts at home. All purchases are made by the cook, the mistress never appearing.

A lithe active young negress now makes her appearance before the veranda, and ducks two separate salutations: 'Marnin', Mass'r; marnin', Missis.' This is the market-woman who fetches supplies from Kingston. A large bright-coloured handkerchief is twisted, turban-fashion, round her head. Her feet are bare; and she wears a red coral necklace, and a light cotton dress with a long sweeping train. The work done by these women is something extraordinary. 'She will start,' Mrs Edgeware told me afterwards, 'between four and five in the morning, and reach Kingston about eight. Then she will leave any letters, or do any commissions that Charley or I may have, and then do the marketing, and be back here before four o'clock. To-morrow, she will bring up two small joints of meat of about fourteen pounds, a dozen pounds of rice, some fish, vegetables, and a couple of tins of preserved butter. She will carry all in a tray on her head; and for this she gets—eighteenpence.'

It takes a quick pony forty-five minutes to walk from Craigton to the foot of the hill; from thence to Kingston is at least eight miles. These facts will enable our readers to form an idea of the amount of work done by a Jamaican negress for eighteenpence!

The day wears on; and about four in the afternoon, Charley makes his appearance chaperoning the Misses King, who are the daughters of a planter on the north side. Miss King is tall and slight; the younger, Miss Florence King, has curly hair and laughing blue eyes. She flirts audaciously with the Major; and laughs gleefully when Elsie, with mock-gravity, remonstrates with her thereat. Like most Creole girls, they both ride to perfection, and are wild with excitement about the coming dance. Then the Colonel and one of the officers of the First West turn up, and we sit down unceremoniously to dinner. After dinner, when we are preparing to start, Charley makes his appearance in dress-clothes.

'Hullo! Charley,' I cry; 'some one has been playing you a trick.' Both tails of his dress-coat are pinned up; and the effect is exceedingly absurd. I look round for sympathy; but no one laughs. 'Look at your coat-tails, man!' I exclaim astonished at the profound gravity which prevails. I am pulverised by being told that this is the correct thing in the hills. When going out to dinner, you must ride, and equally of course you must pin up your coat-tails, to prevent their being soiled by the pony's flanks. We live and learn, think I, as I mount my pony.

As we sally out at the gate, our party (of seven) is reinforced by the Dean and his wife and two more young ladies. The Dean has a large district, and does his work as conscientiously and thoroughly as any man living, though he believes, as do most sensible men, that mankind are all the better for a little innocent amusement. He has been hard at work all day, and is quite prepared now to enjoy the clear mountain air, to laugh at Captain P——'s representation of Citizen Sang-froid in the forthcoming theatricals, and even to look on a little at the dance that is to follow. The two young ladies are daughters of a leading legal official, who lives in the plains, and doesn't like to face the hill-roads. We form quite a cavalcade as we wind down the steep road that leads to Middleton. One drawback to these mountain-roads is that, being obliged to proceed in single file, conversation is difficult.

Native girls, with loads of various kinds on their heads, pass us, dropping courtesies as they pass. Little woolly urchins, some black as jet, some of a beautiful rich bronze, perch themselves on the banks of the road. 'Marnin', Judge; marnin', Major; marnin', Dean!' they scream out, always winding up with: 'Beg quattie;' meaning thereby the quarter, a small silver coin, value three-halfpence.

Darkness falls rapidly after we have passed Middleton and are ascending the slopes beyond. The road, scarped out of the side of the mountain, is in many places in deep shadow, and a false step might precipitate horse and rider hundreds of feet down to the Hope River below. A halt is called, and the black grooms—three of them—who accompany us on foot, light large stable lanterns. The party breaks up into three divisions, and each division headed by a light-bearer, we start again. The whole thing has a strangely weird effect, the lanterns flashing among the trees, now behind us, now before, as we wind up the zigzags, and lighting up, now a girl's lithe form, now a negro's woolly head, and now throwing into bold relief the stalwart form and soldierly features of the Major, who, with a huge brier-root pipe between his teeth, leads the way. Overhead, a star or two peep out; and far below, unseen in the darkness, the Hope River foams and fumes. We are nearing our journey's end now. A rattle of arms and a hoarse cry of 'Who goes there?' ring out in the darkness. 'A friend,' in Charley's clear voice; and the lan-

terns flash on the red-coated sentry as he stands at attention on recognising the Major. A few minutes more and we are in front of the messroom, being cordially welcomed by our gallant hosts. Dressing-rooms for the ladies have been improvised, and the soothing cup is awaiting them, while red-jacketed warriors press sherry, and brandy and soda on the ruder sex; nor is what Mr Richard Swiveller called 'a modest quencher,' at all unwelcome, for the northerly breeze is keen enough.

A stage, with tastefully painted scenery, has been erected at one end of the messroom; and we are soon all seated, and thoroughly enjoying Captain P——'s excellent acting of Citizen Sang-froid in *Delicate Ground*. The farce of *Two Gay Deceivers* follows; and then we adjourn to supper, a capital one too, in the billiard-room; while a fatigue-party clears away the seats and prepares the messroom for the dance. Not being much of a dancing man, I lit a cigar and strolled outside. The fun was waxing fast and furious now. As faster and faster sped the dancers across the lighted windows of the messroom, it was curious to watch that little central spot of light and mirth and gaiety in the midst of the huge hills, whose blurred masses towered around. Now *John Peel* rings out. Faster across the windows flit the dancers, and I can hear the fresh young voices carolling the chorus of that famous hunting song. Now it is over, and the veranda is thronged with breathless damsels attended by perspiring cavaliers.

Again the music strikes up, but this time it is a waltz; and a vision of past seasons, of their dead hopes and buried loves, rises before me as Strauss's waltz, with its long dreamy sensuous swell, floats out to die on the soft still night. At last even Creole endurance begins to find out that it has its limits. The stars were now fading out, and a gray light was stealing up behind Catherine's Peak. It was nearly five A.M. Ponies were ordered; and soon the inclosure in front of the mess was crowded with those hardy little animals and their black grooms. The Major, sternly disregarding all petitions for 'just one more turn,' was busy packing off his charges under his wife's wing to the ladies' dressing-room. The last panting couple have stopped from sheer want of breath, and at half-past five A.M. *God Save the Queen* is played. '*So* charming!' —'*Such* a nice dance!'—'*So* good of you to get it up!' I hear murmured on all sides, as the girls scurry off on their cavaliers' arms to the Colonel's quarters, where Mrs S—— has tea awaiting them.

Meanwhile, we men adjourn to the supper-room for a stirrup-cup. 'Lots of time yet,' cries a perspiring subaltern, catching me by the arm and hurrying me to the table. 'Ladies won't be ready this half-hour. What is it to be? Champagne-cup? B. and S?—All right. Mess-waiter—two B. and Esses.' Pop go the corks.

'Now then!' shouts the regimental Major from the top of the table. 'Where's the Brum? We want "*Drink, Puppy, Drink.*"'

Why it is called 'The Brum,' I know not: but at the Major's command a handsome fair-faced English lad responds: 'All right, sir; here goes;' and presently the rafters are ringing with the chorus of poor Whyte Melville's last hunting strain.

Everything, even a dance in the Jamaica hills, must end some time. The ladies come trooping down, and we are in the saddle again, winding down the hillside. Harking back with our eyes, we can see the lights of the messroom away above; and can hear *Drink, Puppy, Drink* being chanted with renewed vigour. We are too sleepy to talk much. Miss Martin only faintly reproaches me for my not having come for the second fast dance. It is a quarter to eight A.M. as we turn into the gate of Craigton; and in a few minutes I am in the land of dreams.

AUTOGRAPHIC PRINTING PROCESSES.

MEN of business, writing letters from their office, do so in a strictly regular manner, by fixed rules; and each letter is in many instances the joint production of at least two minds. To explain how this is, we must remember that busy men have not the time to go through the manual labour of writing their own letters. A solicitor in good practice, for example, will have a shorthand clerk constantly at his elbow. The letters are dictated to this clerk, who scribbles his pencil hieroglyphics in a note-book as fast as his master can give utterance to the sounds which they represent. This clerk afterwards translates his notes into longhand, reconstructing a sentence where necessary. The principal has merely to sign his name, and the letter is finished. But before it is sealed, a very necessary operation is performed—the letter is copied. To the various modes by which this is performed, it is our intention in this article to direct the reader's attention.

The most obvious method of copying letters is that of taking an ordinary pen and ink and reproducing them word for word; and this was the system necessarily adopted in all offices thirty years ago. It is clear that this process is open to all kinds of errors, and also carries with it the objection that a principal might complain that his clerk had not faithfully reproduced his words. To facilitate the reproduction of letters, copying-ink was invented—that is, ink mixed with some sticky preparation, such as sugar, so that its impression could be conveyed to sheets of damp paper. The impression is of course reversed, or what a photographer would call a negative; thin paper is therefore used, so that the words can easily be read from the other side. This system is extensively adopted, and is in use at most offices. The letters are either impressed direct into a bound book of thin paper, or upon loose sheets, and afterwards bound. In either case, the volumes thus obtained form a complete history of business correspondence as conducted from day to day. The plan is all that can be required where a single copy only, is necessary.

It, however, often becomes necessary in large offices to send out numbers of circular letters on the same subject. This necessity was at first met by employing a very intense copying-ink, which would allow several fac-simile letters to be produced from one original. But with the best inks, such copies were limited to six or eight, and the last produced was of a very vague and attenuated character. The lithographic process, by which a letter, written in special ink and on special paper, can be transferred to stone and reproduced by the hundred, fulfils the purpose admirably. But it requires the assistance

of a skilled lithographer; and for that and many other reasons, does not exactly meet the want indicated. The means for expeditiously multiplying copies of circulars and the like by unskilled hands, has only been successfully accomplished within very recent times. The apparatus by which this is done may be divided into two distinct classes; by one of which a stencil is formed, through which the ink is pressed, and in the other a medium is found to hold the image of the writing; as in the lithographic process, where a stone is employed for that purpose. The art of stencilling is familiar to our readers in various forms, stencil plates for all kinds of purposes being in use in the arts and different trades. The first form of stencilling pen was a small pointer, which was made to travel very rapidly with an up-and-down motion, by which it pierced paper placed beneath it. This pen was worked by a treadle, and was somewhat cumbersome. The same idea has lately been improved upon in the production of a pen which contains its own motive-power in the shape of clockwork. Traced over a piece of paper, this little engine forms lines of tiny pricked holes. The pierced paper so produced forms the matrix, from which many copies can be obtained; but the process is somewhat slow, and has the disadvantage of making uniform up-and-down strokes on the paper, by which the characteristic features of a particular handwriting are destroyed. The apparatus too is somewhat expensive, a clockwork pen of this description costing no less than five pounds.

Of the same genus and outward appearance is the famous Electric Pen, due to the ingenuity of Mr Edison. The only difference is that a magnetic engine takes the place of the box of clockwork at the top of the pen. But here a fresh complication comes into place in the form of the inevitable electric battery, with its tiresome solutions and general uncertainties. In its results the Electric Pen is no better than its clockwork prototype, and is nearly double the price. In both cases the copy produced is not a fac-simile of the original writing or drawing; for the reproduction is formed of dotted and not continuous lines.

Of a far more inexpensive and effective character is the 'Papyograph,' which, we believe, was patented before the era of Mr Edison's Electric Pen. In this case, a paper is used for the stencil, which has been saturated with a resinous varnish. The pen is charged with a strong solution of caustic soda, which decomposes the resin, and turns it in fact into soluble soap. The paper is now soaked in water, which removes the soap, and leaves the writing in the form of a porous stencil. A velvet cushion is now impregnated with an ink composed of aniline violet and glycerine. The stencil is placed upon this, and a sheet of clean paper above it. Pressure is then applied; the ink is forced through the interstices of the fibrous paper; and a perfect copy is the result. By this simple process, more than five hundred copies can be rapidly obtained from one paper stencil. One other process belonging to the stencil family must also be noticed, although it partakes of the faults of some of those named in reproducing a dotted copy. In this method the stencil is formed by writing with a steel point upon paper which rests upon a metal surface, this surface being roughened like the face of a file. The characters are in short rubbed into holes; the copies being reproduced by the application of an ink cushion in the way already indicated.

All these methods have one great fault, in either reproducing a false copy of the original, or forcing the writer to employ materials he is unaccustomed to, and which warp and disfigure his handwriting. These difficulties are entirely obviated by a little apparatus called the Chromograph. The idea is clever and full of originality; and the apparatus, —which seems to be common property—is produced and sold under various names, such as Compo-lithograph, Hektograph, Multiscript, &c. It consists of a zinc tray filled with a gelatinous white preparation, the mode of using which being as follows. A letter or drawing is made upon ordinary paper with aniline ink. When this is dry, it is carefully placed face downwards on the white surface, and rubbed with the hand. By lifting one corner, it is gently pulled away from the preparation, when it is found that the ink has been mostly transferred to its temporary support. The image on the gelatine surface is now used as a negative, from which some dozens of copies can be had. These copies are most vigorous, and the first twenty or thirty will shew no signs that they have not been separately written by hand. After that number has been obtained, the proofs become rather pale, but still legible and fit for use. It will be observed that no press is required save the simple pressure of the hand on the back of each sheet of paper as it is applied to the negative. The system is not only applicable to the reproduction of writing, but can be used for drawings, diagrams, and music. It is, moreover, so simple in its character, that the apparatus can easily be made at home; and we have much pleasure in placing before our readers the means by which this can be done.

Suppose that we wish to copy letters of the ordinary note size, we shall require a piece of ordinary roofing-zinc measuring twelve inches by nine. The edge of this must be turned up half an inch all round, so as to form a tray for the reception of the composition. This requires some little care in its preparation. First, place two and a half ounces of common gelatine in cold water, and let it remain there until it becomes quite flaccid. The gelatine so treated is then placed in a gallipot, which has itself been placed in water in a saucepan. Heat is applied, and, as the gelatine melts, one pound of glycerine is poured upon it, and thoroughly stirred. An ounce of finely powdered chalk is also added to the mass and incorporated with it. Heat is kept up for ten minutes or more, to drive off some of the water, when the gallipot is removed, and its contents poured into the zinc tray prepared for its reception. This should be placed on a level surface as the gelatine compound cools and sets in about an hour. It must then be sponged with cold water and wiped dry, when it is ready for use.

The ink is prepared by mixing aniline violet in powder with seven parts of water and one of alcohol, the resulting proofs being of course of a bright violet hue. In using the ink, care should be taken that enough is applied to the paper to give that metallic sheen by reflected light which is so characteristic of the aniline dyes. The

colour of the ink is in some cases rather prejudicial to the use of these gelatine contrivances, which no doubt has limited to some extent their employment. But lately a black ink has been produced, which is said to give copies as good, with the advantages of a more sober tint. The composition of this ink remains a secret.

THE MYSTERIOUS HOUSE.

IN THREE CHAPTERS.—CHAPTER I.

'LARGE and roomy; well-furnished; good garden; healthy neighbourhood; within easy reach of a railway-station; good boys' school near; not far from London; cheap!' Thus, with something more than a suspicion of scorn in her voice, my sister Margaret ran off on her fingers the list of my requirements for a house.

I had just returned from India with my six children, and I was anxious to settle them comfortably before their father's return.

'You want every comfort,' continued my sister, 'and you don't want to pay for every comfort. I believe you Anglo-Indians think we live upon nothing in England.'

Her husband came in as she spoke. Turning to him, she ran over again, with a slight exaggeration and a deeper infusion of contempt, the catalogue given above.

He took a seat. 'Difficult,' he said, oracularly; 'but it might be done. I have it!' said he, turning to his wife.

'What? The right house! Then you are cleverer than I thought you.'

'Do you remember the story Williams told us yesterday?'

'Now, James,' said my sister, rising to her feet, and looking at her husband severely, 'if you advise Eleanor to take that house, you do it on your own responsibility. I wash my hands of it.'

'Sit down again, Margaret,' he said. 'Be reasonable, my dear. Is there any sufficient reason why Eleanor should not take that house?'

'There is one very good reason—she will have to do the house-work herself. No servant will stay a week.'

'She has an Indian servant at anyrate, who must stand by her.'

'But think of herself, of her feelings.—You smile, James. O yes; I know you think me absurd. Very likely I am absurd; but remember this—there's no smoke without some fire. Besides, I knew the last tenants. Mrs Green is not an idiot. She told me'——

'Stay a moment,' said my brother-in-law, and he addressed himself to me.—'Eleanor, tell me the truth: are you a believer in ghosts?'

'Does this mean that the eligible house is haunted?' I exclaimed, much stimulated by what I had heard. 'If so, I will take it at once. Write to the agent for me, James.'

'I do believe you are all going mad,' said my worthy sister, holding up her hands in horror.—'James, you are a sensible man. You know things ought not to be done in a hurry.—Eleanor, listen to what I heard from the last tenant. She told me with her own lips; it is none of your second-hand stories'——

'No,' I interrupted; 'don't tell me. If there is a ghost, it will shew itself. If there is not, I might be set thinking of your story, and might imagine it; or at least'—correcting myself—'I might be betrayed into telling somebody else. Somebody else might imagine it.'

My brother-in-law thereupon entered into an elaborate description of the house, which had everything I could desire; and he believed I could have it for a rent, which was so small, considering its advantages, as to seem merely nominal. 'The fact is,' he said, 'their principal object is to have the thing off their hands. Tenants have been coming, and tenants have been going; and some have paid, and some have not paid. The place has got a bad name in the neighbourhood. The owners, however, think that if a respectable tenant comes and stays for some time, it will have a good effect on the public mind. But, as Margaret says, you must count the cost. Your servants will be sure to hear the ghost-story. They will see visions and dream dreams. You may have to do a good deal of the work yourself. By-the-by, there is an old housekeeper, a Mrs Weevil, who lives in the lower rooms.'

'Could we not get rid of her?' I said. 'She might tell the servants.'

'I am afraid that would be easier said than done,' he answered. 'She has some claim upon the family. But they say she is a quiet old soul, who interferes with nobody. You might warn her, you know.'

'Well,' I said, 'let us write to the agent, and see what can be done.'

The result of all this was that, a week or two later, on a placid afternoon early in the month of August, I drove up with my children, servants, and luggage before the deep porch of one of those moderately sized country-houses which abound in the county of Surrey. It was to be my home for the next twelve months—servants and ghosts permitting.

For once, description and the expectation that followed hard upon it were, I felt, abundantly justified. My earthly paradise was a paradise indeed; and joyfully, on the evening of our arrival, I sat and wrote to my husband of our good fortune. The house was beautifully situated, and was itself picturesque, with its deep porch in front, and the neat balcony that surmounted it. It was an irregular building, and its red brick walls were half-smothered with ivy and clematis. Beyond the garden in front was a broad lawn, bounded by the grand old beeches and elms which form a belt round Lord B——'s estate. During the first few weeks, nothing happened to change my good opinion of the house.

There was one circumstance I did not like; but I persuaded myself it was trivial, and to be affected by it proved ultra-sensitiveness; besides, I had been warned beforehand. Two of the lower rooms were occupied by an old woman. She was a pensioner, I was told, of our landlord's. Many years ago, she had been housekeeper to some relatives of his, who lived in the house, and she had lived in it ever since. I wished to see her and have some conversation with her. I disliked, in the first place, that any one of whom I knew nothing should be in my house; and in the second place, I was anxious to warn her to keep the ghost-story (whatever that might be) secret. My

three English servants were north-country girls. I had taken good care that they should be utter strangers to the neighbourhood; but I knew, if the possibility of seeing a ghost were suggested to them, they would promptly make the possibility a certainty, and then my troubles would begin.

I sent a polite message to Mrs Weevil, asking for an interview; and she came to my room. She was not a prepossessing woman. Her age might be somewhere between sixty and seventy; and as she dropped an awkward courtesy on entering my presence, I felt she was giving me a homage which she did not pay willingly. I said I understood she had permission from the owner of the house to occupy certain rooms in it.

'Yes, ma'am,' she said; 'but not from the owner as is the owner of the 'ouse now, ma'am.'

She manifested, I thought, a certain ill-concealed sulkiness as I went on to ask her if she could not be induced to find accommodation for herself in some of the cottages on the adjoining estate, so as to give us the house to ourselves. She stubbornly refused.

'No, ma'am,' she went on to say. 'I am an old woman as has lived here for nigh twenty years, and I never gives trouble to no one. I only wishes to be let alone; and I means to stay, ma'am—yes, I means to stay.'

I saw that it would serve no purpose at present to try to dissuade her; and as I did not wish to quarrel with her, I changed the conversation. I said I understood there were some foolish stories current about the house being haunted, and I hoped, whatever she thought of it, that she would say nothing to my servants on the subject.

'If your servants 'll let me alone, ma'am, I'll let them alone. I has no wish to meddle with any lady's servants.'

I then permitted her to go. She was certainly no trouble about the house; and she was very seldom seen either by me or the servants. She only went out occasionally, as if to make such purchases as her necessities might require, locking the door of her rooms both in going and returning.

A month passed by. People in the neighbourhood began to call. They all praised the house and grounds; but they all looked mysterious, and one and another hinted: 'You won't stay here over the winter.'

My answer was a smile. But the winter came. Flowers faded; trees grew red, golden, brown; and at last their shivering leaves fell to the ground. It was an early winter. In November, the cold was intense, and the days were short and gloomy. Many years had passed by since I had spent a winter in England, and I felt the cold very much. I made the best of things however, muffling myself and the children in flannel, keeping the doors and windows closed, and having large fires in the rooms and hall. In spite of all I could do, two of them fell ill. Their illness was not serious; but nursing and looking after them gave me much to do, for their ayah (Indian nurse) was suffering at the moment from a severe cold, which rendered her almost incapable of helping me.

Such was my position when, one morning, my housemaid asked to see me. I knew what this meant; and was not surprised to hear that she intended to leave us that very day. Her mother wanted her, she said. I asked her mother's reason. She was impenetrable. I offered her higher wages. She said, tremblingly, that she would not stay if I were to offer her a hundred pounds. I began to perceive that the news of the ghost-story had got abroad; and I asked her if there was anything in the house of which she was afraid; but to this question she was dumb. I said I would see her again, and sat down to think, with my sick child in my lap. Even while I was thinking, there came a knock at the door of my room. I cried out, 'Come in;' but my heart sank.

My cook was at the door. The girl who helped in the kitchen and house was behind her. Both looked scared, and announced that they were going.

I did not know what to do. To gain time, I ordered them back to their work. I had no money in the house, I said. The bank, as they knew, was some miles distant. They had no right to leave me without due notice; in fact, I would not let them go. So I said, and hoped that they were quieted for a time. But late that evening, the ayah came to me with consternation in her face. All the three English servants had left me!

By that time the children were in bed, and everything was still. I bade the ayah go to her room with the younger children, and after locking my bedroom door, sat alone, thinking. I had passed through an exciting day. The night was chilly; I was tired, and not very well. That the warmth of the fire and the comfort of my favourite lounging-chair should presently cause a delightful sense of indifference to all and every annoyance, need not be considered wonderful. As I sat there, I gave way to the pleasant compulsion, and was soon, I imagine, fast asleep. I say I imagine, because there was no witness present; and of what we do, or what we don't do, in that strange indefinite border-land of sensation which separates waking-time from sleeping-time, we can never be perfectly certain.

So far as I know, I slept for some considerable time. It was the sensation, I believe, of my feet waxing cold that first loosened the bonds of slumber. While I was in that semi-conscious state, which has a peculiar discomfort, I became dimly alive to the fact that there was in the room some presence other than my own. There was movement—a stirring in the air, as if some creature had come in. The events of the day returned to my memory, which was still only half alive. I started up, rubbing my eyes, for I could not be at all sure that I was awake and in my right mind.

When I went to sleep, I was alone. Yes, certainly. But even if it were not so, what strange pale face was this now gazing at me across the dimly-lighted space of the shadowy room? I was but half-awake. My nerves were in an excited state. The ghost in the house had been my last conscious idea. And now this strange face, which seemed to be advancing on me out of the gloom, was it a creation of my own fancy? Or was it some one playing a trick upon me? In any case, now was my time to fathom the mystery. Trying to be courageous and gather my wits together, I advanced. The face receded, and passed into the deeper shadow, till it appeared to be suddenly swallowed up in the draperies of

the heavily curtained window. I rushed forward, but was not swift enough. Before I touched the curtains, the face had disappeared. I was certain, however, perfectly certain that as I drew the curtains open, I felt resistance to my hand, and at the same time a gust of colder air rushed against my face, as if from an opened window. At first, I felt as if about to faint; but my will, fortunately, was strong, and I threw the curtains aside, and put my hand on the window. It was closed. I tried the bar, which could only be fixed from the inside, and it was as I had left it early in the evening.

At this discovery, my agitation overpowered me, my head swam, and I fainted. When I recovered consciousness, I was lying in the broad recess of the curtained window, and I felt a trickling sensation on my forehead, and suspected, what I afterwards found to be the case, that I had struck my head on some article of furniture, and was bleeding. This involuntary blood-letting helped to revive me, and I sat up.

For a few minutes I remained partially stunned and bewildered. I felt a creeping sensation, as if I had been struck by a frost-wind. After a while, my heart began to beat less audibly, and I rose to my feet. At that moment the embers of the fire suddenly sank into the bottom of the grate, sending up a faint flickering light, which was absolute cheerfulness as contrasted with the horrible semi-darkness that had hitherto prevailed. I felt my courage returning, and managed to ring the bell. The ayah came, alarmed that I should have summoned her at an hour when she supposed I had retired to rest. I did not tell her what I had witnessed, only asked her to light a candle. She did so, and as the light fell upon my face, she gave a slight scream. I had forgot at the moment that blood was trickling from the wound I had received, or I should not have asked her to light the candle. As it was, I had to make the best excuse I could in answer to her inquiries. I said I must have slept long by the fire, and in moving about the darkened room had fallen and hurt myself. The wound, however, was found to be a mere scratch; and in a few minutes the ayah had succeeded in removing from my face all marks of the disaster.

I asked her to leave the candle with me, and allow me to retire to rest. She did so; and after the door was closed upon her, I proceeded with the candle to examine the window more minutely. The mystery was as much a mystery as ever. The window had certainly not been opened by any one, and no trace was visible on the walls of any possible means of egress or ingress. I felt more nervous than ever, and was about to turn and quit the room altogether, so much did my fears oppress me, when something lying on the floor within the recess attracted my attention. I stooped and picked it up. It was a small piece of white cloth—a few inches square—very frail in the texture, as if half-rotted with damp or age, and adorned with a peculiar kind of embroidery such as I thought I had seen before, but could not recall where. On one edge there was a hem; the other three edges being irregular and jagged. It looked like a piece of cloth wrenched out of a garment by the foot being suddenly placed upon it. I felt I had made a discovery.

Returning to the fireplace, I sat down to think. It seemed clear to me now that my visitant, however he or she had effected an entrance, was no spirit. This piece of linen was certainly not lying there when I had closed and barred the window for the night; nor could it belong to the apparel of any member of my household. It was not unlikely that it was part of the loose garment of dingy white which I now remembered my strange visitant wore.

I am naturally strong-minded, and gradually began to recover my composure. I said to myself: 'I shall find out the secret. The first link of the chain is between my fingers. I never before heard of ghosts tramping bits out of their drapery, and no doubt the ghost I saw had been nearly as much afraid as myself when I so suddenly approached it, and had not got away without a little flurry. This accounts, too,' I thought, 'for the resistance which I felt to my hand when I first laid hold of the window-curtains.'

I was more than ever persuaded that a trick was being played upon me. I did not feel, however, as if I could sleep in the room that night. If my visitor was, as I suspected, a mortal like myself, there was no saying what he or she might be induced to attempt, should the desire of revenge prompt a second visit. My life was not safe in such circumstances, when a barred window and a locked door were not sufficient to protect me from intrusion. I resolved for that night to occupy the bedroom where my two eldest children slept, which I could reach without disturbing the rest of the house.

I was about to take up my candle and go, when I imagined I heard a sound behind me. In my state of nervousness, I started, and had almost dropped the candle. I looked towards the window; but the curtains hung motionless, and were parted as I had left them.

A thought struck me. If my visitor were to return after I had retired, how should I know? I pondered the matter a little, and then proceeded to action. Trickery must in this case be met by trickery. I went to my workbox, took out a reel of thread, and drew off a few yards. There were curtain fasteners on each side of the window, about two feet from the floor; and between these I stretched and made fast the length of thread, so that no one could enter the room from the window-recess in the course of the night without unconsciously breaking the frail barrier I had erected. This would afford me sufficient proof as to whether the privacy of my sleeping-room had again been invaded. Taking up my candle and the bit of cloth, I then passed quietly out, locking the door of the room, and carrying the key with me. I felt myself stronger in the presence of my children, and soon managed to fall asleep.

A FEW WORDS ABOUT TUNNELS.

MANY curious things might be said about tunnels, old as well as new. For instance, the stupendous work—whose history links modern with ancient engineering—the object of which was to connect Lake Fucinus, now called Celano, with the Liris, now the river Garigliano, was undertaken 42 A.D. It took nearly eleven years to complete, and thirty thousand men are said to have been engaged upon it. This subterranean canal was executed by order of the Emperor

Claudius. For nearly eighteen centuries it seems to have been forgotten; but on its discovery about sixty years ago, the Neapolitan government resolved to clear it out. This was accordingly done, but not until several years had been spent upon the task. The improved tunnel is four miles long; the original length was three miles. Prince Torlonia of Rome gradually bought up the shares, and carried on the operations at his expense until his death in 1871.

Modern tunnelling—which by the way, is quite a distinct profession—is of three classes: first, tunnelling through soft ground such as clay, loose rock, &c.; second, rock-tunnelling without machinery; third, tunnelling through solid rock by the aid of machinery. In piercing a hill or other mass of earth, a large quantity of timber for temporary arching is required, until the brick or stone work has been provided. In some methods of tunnel-making it is judged more secure to brick the timber in. But this is very costly, especially when all the heavy timber has to be conveyed down a shaft or slope. Where the ground is rather yielding and much water appears, an inverted arch is constructed across the bottom of the tunnel, so as to resist the pressure from beneath. There are now, however, other methods of construction in use. A new system has been devised of employing iron centres as a substitute for timber. Tunnelling through loose rock, timbering, and then arching, is the method mostly in use in this country and America; and where the length is comparatively short, hand-labour is found cheaper than the employment of machinery. But at the present day, this kind of engineering is conducted on a vast scale with steel and diamond pointed drills, driven by compressed air (at about forty pounds to the square inch), which latter serves for ventilation purposes. In this way longer holes can be cut and heavier charges of dynamite employed.

The first sub-aqueous tunnel in England was that under the Thames from Wapping to Rotherhithe, known as the Thames Tunnel. It was begun in 1807; the operations were stopped after a time; but recommenced by Sir M. I. Brunel in 1825. The work was again interrupted by accidents; but the causeway was eventually opened for foot passengers in 1843. In the year 1867, it was purchased by the East London Railway Company. It is twelve hundred feet in length. Another subway is planned between the north side of the Thames and South Woolwich; it will be much deeper below the bed of the Thames than the older subway, and is to be constructed to admit of the transit of troops and war-material from Woolwich to the north side of the river, thus avoiding the circuitous route over London Bridge. Of this class we must also mention the Severn Tunnel, commenced in 1875, and now well on towards completion; but the bursting of a spring last year caused a serious interruption to the operations. The cutting has been mostly through rock, and about one hundred yards in the centre of the channel yet remain unpierced. Among other important works, the son of the eminent engineer above mentioned constructed Box Tunnel on the Great Western Railway, in the vicinity of Bath; it is nearly four miles long. The Woodhead Tunnel, near Manchester, is three miles in length; a second cutting of the same dimensions was afterwards made parallel with it, but separated by a longitudinal pier. The Kilsby Tunnel on the London and North-western Railway was four years in construction; it is two thousand four hundred yards long, and cost three hundred and fifty thousand pounds; nearly four times the original estimate. Peculiar difficulties were encountered in making the Sydenham Tunnel (London, Chatham, and Dover Railway). It is cut through the London clay, and while the works were in progress, the clay commenced swelling and crushing the masonry. This was so serious, that over eight thousand cubic yards of work had to be rebuilt. Considerable progress is just now being made with borings for the tunnel to be cut by the Mersey Railway Company under the bed of the Mersey. The shaft on the Birkenhead side has been sunk to a depth of about one hundred and twenty feet with most satisfactory results. The boring is through the New Red Sandstone; on the Liverpool side, a depth of one hundred feet has been reached. It is scarcely necessary to mention the tunnel which forms the chief feature of the Metropolitan (or Underground) Railway of London, opened January 10, 1863, and since extended in several directions. A similar work is projected for Paris at an estimated cost of six millions of pounds. There are now over eighty miles of tunnelling in England.

Tunnels for portions of canal in hilly regions are sometimes of great length—such as the Canal de St Quentin, more than seven miles long; the Huddersfield, and the Mauvages (Canal du Marne au Rhin), three miles each; Sapperton, Thames and Medway, Dudley, Blisworth, Soussey, Pouilly, ranging from two to four miles.

Transatlantic enterprise of this class has made great advances of late years. We select two or three out of nearly a score which deserve mention. The Hoosac Tunnel (Massachusetts) was constructed to provide a direct route to the Hudson River. Until the cutting of this one, all rock tunnelling in the United States was effected by hand-labour. It was commenced in 1858; and after several delays, arising from pecuniary difficulties and a serious accident in October 1867, it was finished in 1874. Under Lake Michigan, there is a tunnel, or rather aqueduct, constructed to convey pure water to the city of Chicago. This important work was begun in 1864, and completed in 1867.

In August 1857 the celebrated Mont Cenis Tunnel—incorrectly so termed, because it is sixteen miles from that mountain: the tunnel actually passing under the Grand Vallon—was commenced by manual labour, and continued so to be worked until 1861, when rock-boring machinery came into use; in consequence of which, rapid advances were made. The First Napoleon constructed a magnificent military road over Mont Cenis Pass; and this was used regularly by travellers. At length, when the French railways had crept close to one flank of the range, and Italian railways close to the other, plans for a railway tunnel to connect the two were formed. The French and Italian governments agreed to share the cost between them. The tunnel is nearly eight miles long, and as much as five thousand feet above the level of the sea. After working from opposite sides of the mountain, the workmen at length met in the centre, December

26, 1870. On the 17th of September in the following year the great undertaking was inaugurated in state, the ceremony being graced by the presence of the Empress Eugenie.

And now, in spite of the German prophecy, that 'a large lake would be met with, which would put a sudden end to all the work,' we are able to record that on Sunday, 29th February 1880, the St Gothard Tunnel, another gigantic effort of engineering, was accomplished. Thus for the second time have the hoary Alps been pierced through their very heart. In January 1871, the work was commenced, with MM. Gerwig and Koller as chief engineers and M. Grattoni as contractor; but the contract was afterwards transferred to M. Favre, who, it is said, was at one time a journeyman carpenter at Paris. It was in September 1872 that the Italian side of the St Gothard at Airolo was attacked. The heading driven at top was about eight feet square, and the improved M'Kean drill employed during the later part of the work—a machine which cut its way at the rate of twelve inches per minute. The contract for this tunnel was nearly two millions sterling, and the foregoing figures represent a cost of three pounds ten shillings for every inch of boring; but the actual cost, including formidable approach works at the two ends, will amount to several millions more by the time they are all fully completed. The tunnel itself is about nine miles and a quarter in length. In the centre of the mountain, the temperature was found to be almost tropical in character, the ventilation of the passage being kept up with difficulty. We regret to learn that this great work —like so many others which are an honour to science and the glory of this century—has cost nearly seventy lives; to which must be added that of M. Favre, who died in the tunnel some months ago. It appears that, fearing injury to their traffic from Paris to Brindisi viâ the Mont Cenis, the French are now, in consequence of this new tunnel, boring through the Simplon—estimated at eleven and a half miles in length—and 'already there are rumours of schemes to bore through the Tarentaise and the Col du Mont; and even Mont Blanc is threatened with a tunnel,' consequent upon the feverish competition likely to arise among the Swiss, German, French, and Italian lines.

Five years ago, *La Nature* reported that in Spain an inter-continental Railway Company had been formed to carry out the scheme of connecting Europe and Africa by a tunnel under the Straits of Gibraltar, but nothing has been done in the matter.

But the bold idea of a tunnel under the British Channel will, if carried out, eclipse all former undertakings of this kind. The present 'Channel Company' was formed in 1872; Sir John Hawkshaw, F.R.S., Mr Brunlees, and M. Gamond being appointed engineers. The route finally decided upon places the tunnel on a line extending from a spot between Folkestone and Dover, through the 'Old Gray Chalk,' to a point between Sangatte and Calais, on the opposite coast. The total length will be thirty-one miles, of which twenty-two will be under the Strait. Shafts are to be sunk on each shore to a depth of about four hundred and fifty feet below high-water mark; and driftways from the bottom of these, for the draining of the tunnel, which is to begin two hundred feet above the driftway. These driftways will be driven from both ends on a down gradient of one in eighty to the junction of the drainage driftway; and then on an up-grade of one in two thousand six hundred and forty to the middle of the Strait. The crown of the tunnel in all parts will be not less than two hundred feet below the bed of the Dover Straits. It is hoped that the excavation will be mostly through chalk, in which case comparatively rapid progress will be made. It has been estimated that the probable cost of this titanic task will be about four millions sterling; but Sir John Hawkshaw considers it best to double this estimate, in anticipation of greater obstacles which may arise. The preliminary works are now being prosecuted with great activity. A shaft has been sunk at Sangatte, to the depth of over one hundred metres, and the experimental gallery has been commenced, and is to be continued for a kilometre—that is, three thousand two hundred and fifty feet—under the sea. The raising of the capital for the tunnel itself is, however, still a knotty problem; but if this can be accomplished, so much the better for all parties. As the passenger traffic between England and the continent amounts to nearly four hundred thousand annually, and is yearly on the increase, the opening of this marine subway will be of enormous public advantage.

PREDICTION, IN A SCIENTIFIC AND COMMERCIAL SENSE.

Two friends, A. and B., meeting in the street, the former says that he is just going off by rail. B. might hold forth to him somewhat as follows: 'The railway by which you will travel has cost more than forty thousand pounds per mile. Your train will have about a hundred and twenty passengers, first and last, during this journey. You will pay about a shilling for your ticket (single). There will be a locomotive engine to every mile and a half of line; and the working of the line will swallow up more than half the gross receipts.' A. looks wonderingly at his friend; not knowing whether he is a wizard in disguise, or a joker who is poking fun, or a somewhat presumptuous man who ventures on prediction in the total absence of any certainty—for B. touches also on the smash by collision or break-down that must be calculated on to a defined extent; but A. is in haste to catch his train, and cannot wait to discuss the matter.

And yet B. is not so very presumptuous after all. If instead of saying 'You will,' he uses the form of expression, 'In all probability you will,' he would be very near the truth indeed. Scientific men have discovered that there is a law of continuity, a law of uniformity, which maintains mundane phenomena in a wonderfully regular state. True, there are sudden outbursts of energy in physical events that totally and temporarily disturb the uniformity; but if a wide range be taken for comparison, the uniformity comes back again with a marked approximation to identity. We assert that the sun will rise to-morrow: it never fails to do so; nay, an astronomer gives the

exact hour, minute, and even second of the rising. All our almanacs and calendars rely greatly on this prediction, as without it the determination of latitudes and longitudes, and many other calculations highly important to the welfare of society in general, would come to nought. The prediction is worthy of the trust it obtains. So in all matters around us the case is virtually the same; we predict every hour of the day, although we do not always call it prediction.

To apply this to the case of our two supposed friends. Although railways are exposed to a singular variety of contingencies, catastrophes, disasters, they work round to a remarkable uniformity when a large area is taken as the basis of comparison. For example, the eighteen thousand miles of railway in the United Kingdom have cost the stupendous sum of seven hundred millions sterling; about forty thousand pounds per mile. The length increases every year; but the cost per average mile has been nearly uniform for some years past, and is likely to continue so to be. Again: the working expenses, all the Companies and lines taken into account, year after year differ very little from fifty-two or fifty-three per cent., leaving forty-seven or forty-eight per cent. as net revenue. Again: incessant as is the increase in mileage of line, the number of locomotives per hundred miles remains almost constant; and so does that of carriages and wagons of all kinds. Again: the number of passengers per train, the length of journey made by each, and the sum paid by him for his ride, all display the same remarkable tendency to uniformity. We might go further, and safely assert that even railway accidents come within the same category. True, a Tay Bridge disaster may entail a terrible and sudden sacrifice of human life; but taking one year with another and one railway with another, we can guess pretty nearly how many persons will be injured by railway accidents, and what proportion of the hapless beings will be killed outright. It is in this way that the predictions ventured upon by B. are worthy of full reliance, as resting on a scientific basis.

It is deserving of note that ministers of religion generally manifest much distrust of this word prediction, conscientiously regarding it as a bold interference with the mysterious will and decrees of Providence; and their scruples are worthy of respectful attention. Yet the distrust generally vanishes when these excellent persons take up their wonted position in the affairs of every-day life. A clergyman, having only a life-interest in his benefice, cannot leave the stipend to his family. When he dies, all goes. His widow and children—perchance unmarried and dowerless girls—must quit the parsonage very soon, and find another home where and how they can; they have no claim on the congregation, church-rate, or pew-rent payers, and may be driven to terrible straits to maintain even a decent position in society. The national Church of Scotland, and many of the Nonconformist bodies in England as well as Scotland, make some sort of provision for ministers' widows; but the general rule is as we have stated. If a clergyman wishes to shield his dear ones, he *insures his life;* and this involves as direct a prediction as anything connected with railway phenomena. We proceed to shew how it does so.

Our reverend friend applies to a Life Insurance Company, Office, or Association—a safe and reliable one, let us hope—and effects an insurance on his life. He agrees to pay a certain annual premium, on condition that a certain lump sum shall be paid to his widow or other representative after his decease. But how about this certain amount of premium? The Company do not know whether he will die next year or live to be a centenarian; and this would make all the difference between a heavy loss and a magnificent profit. Here the law of averages steps in. No one can tell when his own death will occur; but if (say) a thousand persons of the same age all insure at the same time, a wonderful approach to uniformity is reached. The matter has been well and tersely put thus: 'While there are few future events the date of whose arrival is more uncertain than that of death to any one man; on the other hand the average duration of a multitude of human lives is found to be in accordance with a law which operates as surely as that of gravitation. If it be asked how many lives must we take into account before we can depend on obtaining from them a duration corresponding with the general average, the only answer that we can give is, that the more we have the more nearly shall we approach to this result; the fluctuations ultimately becoming so small as to be practically of no effect.' The actuaries or calculators employed by the several Insurance Companies have formed themselves into an extremely useful Society of Actuaries; they compare the past experience of all the Companies, and arrive at closer and closer knowledge of what is sometimes called the 'Expectation of Life,' or the average duration of life after certain definite ages.

The tables which have been prepared by those able men shew all this in a striking way. It is found, for instance, that among a very large number of persons ten years old the mean duration of the *remainder* of their lives will be about forty-seven years; if thirty years old, thirty-four years; if fifty, seventy, or ninety years old, the mean duration will in like manner be twenty-one, nine, and three years respectively. Therefore if we assert that a man at fifty will live to see his seventy-first year, this prediction means a probability so strong as to induce Insurance Companies to rely upon it with confidence. We have spoken only, for the sake of simplicity, of the insurance of one life, to be realised after the death of the person named. But the experience and ingenuity of the various Companies have devised many kinds—insurance for two lives jointly, insurance for a definite number of years, insurance to be payable when sons and daughters come of age, and annuities of several kinds. But whatever it be, the Company make a prediction, or trust to an average which will determine the amount of the premium. It is an instructive system, view it how we may; and its great success and great value shew how well it deserves the confidence of the public.

Life, with all its uncertainties and mysteries, is not the only subject of such kind of prediction as we are here speaking of. How about *Fire?* A man may be utterly ruined in a few hours by a conflagration which destroys his house and stock-in-trade; while a person of more slender means

may be reduced to distress and even poverty by the destruction of his household furniture and personal effects. No wharfinger could bear the sudden and enormous loss occasioned by such a conflagration as that which occurred in Tooley Street some years ago, when an accidental fire destroyed warehouses and property to the value of nearly two millions sterling. Fire is not like life in this respect, for a man must die some day or other; whereas there is no must in the case of an accidental fire. Nevertheless the imperfection of human conduct and of manufactured articles infallibly leads to disasters of some kind or other, whether we call them accidents or by any other name. Well, a man knowing that a destructive fire would be almost ruinous to him, applies to some Fire Insurance Company, and insures his house, stock-in-trade, or household furniture and chattels. The proposal is accepted; and he agrees to pay an annual premium for the security he thereby obtains. This premium varies in amount according to the degree of risk incurred by the Company, ranging from about one-and-sixpence per hundred pounds for ordinary private dwelling-houses up to thirty or forty times that rate for such dangerous buildings as theatres, cotton-mills, &c. Some buildings would be charged at so enormous a rate that the owner prefers to run the risk without insurance, doing his best by care and prudence to lessen the probability of fire.

So far good; but how do the Company know what rate of premium to charge? The reply is just the same as in life-insurance—prediction based on averages. During many years the statistics of fires have been carefully collected, and tabulated with much ingenuity. Not only are the results set forth as 'totally destroyed,' 'partially destroyed,' and 'slight damage;' but the causes also are tabulated so far as ascertainable—'window-curtains ignited,' 'reading in bed,' 'overturned paraffin lamp,' 'children playing with lucifers,' 'overheated flue,' 'hot poker fell out of fire,' 'spark ignited shavings,' 'cat upset clothes-horse'—a queer list in itself unquestionably. The Companies, collecting as many thousand instances as possible, spread over a great number of years, find that there is a wonderful approach to uniformity in these matters, sufficient to justify them in predicting that an average of the whole will be almost absolutely true, and will serve as a guide next year as well as this. They declare at what rate per cent. they will insure a man's property; and the result shews that, while they render a great service to him, they realise a handsome profit for themselves—losing heavily by some insurers, but gaining by the vast majority. Prediction it certainly is, but prediction securely founded on average probabilities.

Just the same is it in principle in regard to *Ships*. They and their cargoes can always be insured against wreck, although no human being knows whether a particular ship will be wrecked or not. Insurances against such disasters have been known for more than three centuries and a half; seeing that ship-insurance was adopted in Spain before that date. It became appreciated in England in the time of Queen Elizabeth. How very uncertain it appears! and yet a clue is arrived at by the self-same kind of prediction as that of which we have been treating. Marine Insurance Companies, and persons called *underwriters*—mostly members of Lloyd's—come to the rescue of shipowners and freighters. They take the risk, and charge a premium for so doing. In estimating the amount of this premium, they take into account the quality of the ship, the nature of the cargo, the length of the intended voyage, the season of the year, the characteristics of the seas and coasts in regard to hurricanes and tornadoes, the known character and skill of the captain, and the state of belligerent rights (or wrongs) at sea. Yet, notwithstanding this complication of uncertainties, those who undertake the risk strike an average among all the recorded calamities in recent and earlier years, and establish rates of premium that are found to deal fairly to them and to the shipowners and freighters. As few individuals could afford to take this risk on their own resources alone, many of them combine to *underwrite* or *subscribe* for aliquot parts each. Prediction there is and must be, but judicious when properly viewed. Some great Shipowning Companies take the risk on their numerous ships, and pay for occasional losses out of a reserve fund set apart for the purpose.

Railway accidents: no one can tell which of us may lose life or limb by these disasters, bringing loss, sorrow, and suffering to others. Nevertheless there is a Railway Accident Insurance Company which will take all these risks. For a wonderfully small premium, so small indeed as threepence for a loss up to a thousand pounds, they will insure any person during one single journey; or will compound for a whole year's railway travelling for a premium definitely named. The only means the Company possess of determining how much to charge is by comparing a vast number of instances recorded by the several railway Companies, and striking an average among them that may justify probability or prediction.

Accidents generally, whether by railway or otherwise, have been taken in hand by the 'Accident Insurance Company.' A more difficult thing this to manage, yet it *is* managed, on the same principle of averages as above described.

Cattle insurance furnishes another example. The losses by cattle-disease are in some instances exceedingly heavy, bringing a grazier or dairy-farmer almost to the verge of ruin. To mitigate this loss, Companies or Associations are formed to take all risks, charging the cattle-owner a definite premium whether his live-stock are attacked with disease or not.—Prediction again, to determine the probability of the event, and the equitable rate of premium to charge for it.

And what are we to say of *Hail-storms?* Meteorologists agree that the times and places at which these visitations occur are specially difficult to predict—almost elude determination in any form. But they have to be borne when they come. Horticulturists and market-gardeners know by bitter experience that a hail-storm sometimes destroys acres of glass in conservatories, greenhouses, hot-houses, and forcing-beds, entailing sudden and heavy loss. Here prediction comes again to the rescue. Companies or Associations have been formed for insuring against hail-storms. Comparisons are instituted over a wide area of country, and a considerable number of years; and it is found as a result that an average probability remains nearly the same year after year. On this the rate of premium is settled, equitable

between those who insure and those who accept the insurance.

Plate-glass insurance seems a whimsical matter; but when an enormous sheet of glass, nearly as large as one side of a moderate room, is broken in a resplendent shop-window, it is no joke to those who have to bear the loss. Here again insurance is effected, albeit the Company or office are quite ignorant whether the particular establishment named will or will not be included among those which suffer.

Honesty—surely this cannot be appraised and gauged by a premium standard? Veritably, however, such is really the case. There is a 'Guarantee Society' which engages, on the receipt of defined annual premiums, to make up the whole or an aliquot part of the defalcations of which a defaulting clerk may be guilty; and banks and large commercial houses fully rely on the soundness of such insurances. A very curious instance this of probabilities, based on well ascertained arithmetical averages of honesty and depravity.

So it is all around us. Prediction, in the sense we have explained, renders its invaluable aid in more ways than can easily be enumerated. If we call it prophecy, the meaning will be pretty much the same; but it is better to say prediction, as less likely to raise objection.

OLD FOLKS.

A correspondent writes to us as follows: Whilst residing in Ceylon a good many years ago I several times heard of men and women living in some neighbouring village who were said to be above one hundred years old; and out of curiosity I went to see them. In that climate, there is little variation of the seasons, and not much to impress the mind with the transition from one year to another; and I found that the supposed cases of longevity were not real, but imaginary. The colloquy was generally something like the following: 'Good-morning, uncle'—a very flattering title for an Englishman to use in addressing an aged native!—'You seem to be very old.' 'Yes; I am a great age now.'—'Well, how old are you?' 'I don't know. I have lost all count. I think I am above a hundred.'—'Indeed! Then you will remember the English taking the island from the Dutch?' 'O yes, I was just thirteen years old then!' As the English took Ceylon from the Dutch in 1795, and the question was put in 1856, it followed that the supposed centenarian was but in his seventy-fifth year! A similar question put to an old woman who was believed to have lived more than a century, would bring to light a connection between some leading event in her life and the imprisonment of the king of Kandy at Point de Galle. Perhaps her first husband died that year, or her eldest daughter was married; and as her recollection was clear as to her own age at the time, there was no difficulty in calculating that she was not much more than threescore years and ten.

Though there are undoubted cases of centenarians in various localities, some of whom have their faculties in wonderful repair, there is an instinctive love of the marvellous in human nature, which sometimes leads old people to exaggerate their age, and in other cases to persuade themselves—though they cannot persuade others—that they are still comparatively young. A gentleman who was shewing me a literary paper which he had written in a very clear bold hand, remarked: 'I always write very distinctly, that I may have no difficulty in reading my manuscripts when old age comes upon me.' He was then bordering on seventy! Another very vigorous old gentleman aged seventy-seven, who was at the head of a large publishing establishment, was explaining to a friend the enormous amount of work he went through from day to day. His friend remarked that it must tell upon him seriously at his age. 'O no,' he replied; 'I don't feel it now; but I expect I shall do in after-life!'

I cannot vouch for the truth of the following anecdotes; but they may serve to 'point a moral and adorn a tale.' In the old coaching-days, when a coach stopped on one occasion to change horses, one of the passengers strolled along a green lane, and was surprised to see an old man sitting under the hedge crying. In answer to a question as to the cause of his grief, he replied that his father had been beating him. The passenger, who thought the father of an old man like that must be a curiosity worth seeing, asked him to take him to his father. The old man led him to a cottage where a very old man was standing at the gate, looking very angry. 'Is this your son?' he asked. 'Yes,' replied the very old man gruffly. 'He tells me you have been beating him,' said the passenger. 'Yes; and he deserves beating, the young rascal, for he has been throwing stones at his *grandfather!*'

I have heard of another old man and his wife, both of whom had reached the venerable age of one hundred. They had three daughters, the youngest of whom died unmarried at the age of seventy-two. The old woman was quite inconsolable on account of their irreparable loss. This youngest daughter had evidently been her pet, for after their return from the funeral, she said to her husband, amidst her sobs and tears: 'I always tellt thee, John, that we should never rear that child!'

ONLY!

In the twilight, in the gloaming,
Of November's thirteenth day,
Lies my open desk before me;
What I muse on, who shall say?

Here are stored my choicest treasures—
Stored for many a weary year!
Desk! old silent friend, I love thee,
Witness mute of many a tear!

Only a blue knot of ribbon,
Dropped from a fair woman's hair!
Only a poor withered flower,
Faded lie, enshrinèd there!

Only one lock, long and golden,
Cut from off a sunny head!
Only letters, sere and yellow,
Traced by fingers white and dead!

Well!—I close thee. God be praisèd!
Bitter memories last not aye!
Time, to tenderness oft mellows
Saddest thoughts of days gone by!

A. H. B.

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